

CLAIMS

1. A preload adjustment device, the preload adjustment device comprising:
 - a) a piezodynamic preload spacer, the piezodynamic preload spacer coupled to a bearing in a momentum control device, the piezodynamic preload spacer configured such that an application of a control voltage to the piezodynamic preload spacer causes a change in a dimension of the piezodynamic preload spacer, and wherein the piezodynamic preload spacer is configured such that a change in the dimension of the piezodynamic preload spacer changes a preload of the bearing; and
 - b) a control system, the control system providing selective control of the control voltage to selectively control the preload on the bearing.
2. The preload adjustment device of claim 1 wherein the piezodynamic preload spacer is located adjacent the bearing.
3. The preload adjustment device of claim 1 wherein the bearing comprises a duplex bearing pair and wherein piezodynamic preload spacer is located between the duplex bearing pair.
4. The preload adjustment device of claim 1 wherein piezodynamic preload spacer comprises a ring shaped spacer having a thickness, and wherein the application of the control voltage to the piezodynamic preload spacer causes a change in thickness.

5. The preload adjustment device of claim 1 wherein the piezodynamic preload spacer comprises a piezoelectric material.
6. The preload adjustment device of claim 1 wherein the piezodynamic preload spacer is coupled to the bearing through an intermediate member.
7. The preload adjustment device of claim 1 wherein the momentum control device comprises a reaction wheel.
8. The preload adjustment device of claim 1 wherein the momentum control device comprises a control moment gyroscope.
9. The preload adjustment device of claim 1 wherein the control system provides selective control of the control voltage to control the preload to compensate for changes in operating environment.
10. The preload adjustment device of claim 1 wherein the control system provides selective control of the control voltage to control the preload to compensate for wear in the bearing.

11. The preload adjustment device of claim 1 wherein the control system provides selective control of the control voltage to control the preload to compensate for thermal expansion in the bearing.
12. The preload adjustment device of claim 1 wherein the control system provides selective control of the control voltage to distribute lubrication in the bearing.
13. The preload adjustment device of claim 12 wherein the control system provides a varying control voltage to distribute the lubrication in the bearing.
14. The preload adjustment device of claim 1 wherein the control system increases preload during a launch of the momentum control device into space.
15. The preload adjustment device of claim 1 wherein the piezodynamic preload spacer is configured to provide a reduced preload with a low control voltage and an increased preload with a high control voltage.
16. The preload adjustment device of claim 15 wherein the reduced preload comprises an optimal operating preload.

17. A preload adjustment device for adjusting preload in a duplex bearing in a momentum control device, the duplex bearing including a first bearing race and a second bearing race, the preload adjustment device comprising:
- a) a piezodynamic preload spacer, the piezodynamic preload spacer coupled between the first bearing race and the second bearing race, the piezodynamic preload spacer configured such that an application of a control voltage to the piezodynamic preload spacer causes a change in a dimension of the piezodynamic preload spacer, and wherein the piezodynamic preload spacer is configured such that a change in the dimension of the piezodynamic preload spacer changes the preload of the duplex bearing; and
 - b) a control system, the control system providing selective control of the control voltage to selectively control the preload on the bearing.
18. The preload adjustment device of claim 17 wherein piezodynamic preload spacer comprises a ring shaped spacer having a thickness, and wherein the application of the control voltage to the piezodynamic preload spacer causes a change in thickness.
19. The preload adjustment device of claim 17 wherein the control system provides selective control of the control voltage to control the preload to compensate for changes in operating environment.
20. The preload adjustment device of claim 17 wherein the control system provides selective control of the control voltage to control the preload to compensate for wear in the bearing.

21. The preload adjustment device of claim 17 wherein the control system provides selective control of the control voltage to control the preload to compensate for thermal expansion in the bearing.
22. The preload adjustment device of claim 17 wherein the control system provides a varying of the control voltage to distribute lubrication in the bearing.
23. The preload adjustment device of claim 17 wherein the control system increases preload during a launch of the momentum control device into space.
24. The preload adjustment device of claim 17 wherein the piezodynamic preload spacer is configured to provide an optimal operating preload for operating in space with a low control voltage and an increased preload with a high control voltage.

25. A lubrication distribution device for distributing lubrication in a bearing in a momentum control device, the lubrication distribution device comprising:

- a) a piezodynamic spacer, the piezodynamic spacer coupled to the bearing in the momentum control device, the piezodynamic spacer configured such that an application of a control voltage to the piezodynamic spacer causes a change in a dimension of the piezodynamic spacer, and wherein the piezodynamic spacer is configured such that a change in the dimension of the piezodynamic spacer changes exerts a force on the bearing; and
- b) a control system, the control system varying the control voltage to provide a periodic force on the bearing and distribute lubrication in the bearing.

26. The lubrication distribution device of claim 25 wherein the piezodynamic spacer exerts a force on the bearing that that changes a preload on the bearing.